

**United States Naval Academy
Mechanical Engineering Department**

EM453 Manufacturing

Catalog Description: EM453 Manufacturing

Credit: 3(3-0-3)

State of the art and advanced process and fabrication techniques are examined for metallic, composite and polymeric materials. Aspects of the production of the basic components of material systems are examined. Also, post processing and thermal treatments to improve the material system will be discussed. The course is directed to proper process and fabrication selection for efficient and safe design of mechanical systems.

Prerequisites: Materials

Corequisites: None

Textbooks: DeGarmo, Black and Kohser, Materials and Processes in Manufacturing
Library Reserve Materials *On Reserve in Nimitz Library*

Course Director: Associate Prof. Angela Moran

Objectives¹:

1. Understand the importance of manufacturing in relationship to design. (a,b,c,d)
2. Appreciate the effect manufacturing has on world markets and global economy. (a,b,c)
3. Define the stages and processes involved in manufacturing a component. (a,b,c)
4. Examine the various fabrication processes. (a,b,c)
5. Evaluate the role materials selection plays in the manufacturing process. (a,b,c)
6. Identify the roles of cost, environmental standards and safety regulations in manufacturing. (a,b,c)
7. Provide hands-on experience in processing and fabrication. (a,b,c,d)

Course Content:

No.	Topic or Subtopic	hrs.
1	Fundamentals of Manufacturing	1
2	Engineering Materials	2
3	Production of Pig Iron	2
4	Steel Making	2
5	Production of Aluminum	2
6	Production of titanium	2
7	Welding	7
8	Safety	1
9	Measurements in Manufacturing	3
10	Machining	6
11	Finishing	2
12	Metal Forming	4
13	Polymer Manufacturing	2
14	Composites Manufacturing	6

Evaluation:

1. Quizzes
2. Exams
3. Homework
4. Shop reports
5. In class work
6. Group project

Acquired Abilities²:

1. Select appropriate types of processing for engineering applications.(1-6)
2. Identify how microstructure is modified by processing and how properties are influenced by microstructure. (1-4)
3. Define the stages and processes involved in manufacturing a component. (1-6)
4. Identify the roles of cost, environmental standards and safety regulations in manufacturing. (1-3)
5. Demonstrate hands-on experience in processing and fabrication.(4-6)

Date of Latest Revision: 24 OCT 2001

¹ Letters in parenthesis refer to the [Program Objectives](#) of the [Mechanical Engineering Program](#).

² Numbers in parenthesis refer to the evaluation methods used to assess student performance.